

**TWO SPECIES OF THRIPS (THYSANOPTERA) NEW TO BRITAIN,
 NEOHEEGERIA DALMATICA SCHMUTZ AND
 FRANKLINIELLA PALLIDA (UZEL), WITH AN UPDATED KEY
 TO THE BRITISH SPECIES OF FRANKLINIELLA KARNY**

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ABSTRACT

Two species of thrips are each reported for the first time in Britain. The first, *Neoheegeria dalmatica* Schmutz (Phlaeothripidae), was found on *Stachys byzantina* Koch at two locations during 2007, initially in a domestic garden in York in June, and then again in July, in a domestic garden in Ashford, Kent. The second, *Frankliniella pallida* (Uzel) (Thripidae), was collected from *Sedum acre* L. at Denham, Buckinghamshire, in July 2006. Information on the identification and biology of these species is provided, along with an updated key to the British species of *Frankliniella*.

NEOHEEGERIA DALMATICA

A well established clump of lamb's ear, or lamb's tongue, *Stachys byzantina* Koch (Lamiaceae), in a domestic garden in Rawcliffe, York, was noted to be infested with adult phlaeothripid thrips. Specimens were first collected by the author on 03.vi.07 and four females and three males slide-mounted. These were identified as *Neoheegeria dalmatica* Schmutz (Thysanoptera: Phlaeothripidae) using information, and a key, provided by Minaei *et al.* (2007), and the identification was subsequently confirmed after comparison with specimens of this species supplied by Bert Vierbergen of the Plant Protection Service, the Netherlands. Further specimens, male and female, were subsequently collected from the plants at intervals.

Alerted by the above finding, a colleague of the author examined the single *S. byzantina* plant at his daughter's garden in Willesborough, Ashford, Kent, on 19.vii.07 (R. P. Hammon). This, too, was found to be infested with *N. dalmatica*. Three of the twelve flower heads (the upper whorls only) were brought back to the laboratory and from these 37 adults and 94 first-instar larvae were extracted. These thrips were also collected from an established plant, one that was already present in the garden before the present occupants moved into the house in 2005. No other member of the Lamiaceae was present in the garden.

The host plants in the garden in York had been purchased as young plants and planted out between 2002 and 2004 (Heather Johnson, *pers. comm.*); the original four plants have subsequently developed into a conspicuous grouping with 40+ stalks. The thrips were initially all located at the base of the developing flower spikes, but on later occasions were seen crawling across the whole flower heads. Thrips were only occasionally seen on the leaves. Numbers increased over the course of several weeks, with several hundred adults present on the clump of lamb's ear on 23.vi.07; adults were still present in large numbers on the plants on 05.vii.07, this despite several intervening periods of sustained and, at times, very heavy rain in a very wet June. Mating behaviour was observed a number of times between 23.vi.07 and 05.vii.07 with one adult dorsally mounting the length of the other and the two then bringing their tubes alongside for no more than 4–5 seconds at most, before disengaging. A

small number of eggs were first noted at the base of the flower heads, on the lower whorls, on 01.vii.07. These were oval-cylindrical, cream to pale-orange in colouration, apparently lacking sculpture on the surface, and approximately 0.425×0.175 mm in size. On the plants, the eggs looked as if they were simply held in place by the tangled downy matrix, but closer examination of an egg under a high-power microscope revealed the presence of a small pedicel at one end suggesting that these were probably glued to the plant as is found in other phlaeothripids (Lewis, 1973). One flower head (the upper whorl only) was removed to the laboratory on 02.vii.07 and kept inside a Universal tube in an incubator at $22^{\circ}\text{C} \pm 1$. Within 48 hours live larvae were seen and after a further five days the tube was washed out with alcohol and 93 larvae were recovered. Only three eggs had been visible on the outer surfaces of the flower head, indicating that the majority of the eggs had been deposited deep in the downy matrix, presumably as protection from predators. Outdoors, first-instar larvae were first seen on the plants on 07.vii.07, but only small numbers were ever seen and later instars were never found. The last sighting of thrips on the plants was that of a single adult and two larvae on 24.vii.07. The rest of the plants in the garden were searched at intervals but *N. dalmatica* remained restricted to the *S. byzantina* plants. Only one other member of the Lamiaceae was present in the garden, a solitary mint plant, *Mentha* sp. No related plants were visible in adjacent gardens.

Following a recent redefinition of the genus *Neoheegeria*, which has restricted the taxon to just four species (Minaei *et al.*, 2007), it seems clear that the genus is primarily associated with the flowers of Lamiaceae. *Neoheegeria dalmatica* is found on downy plants in the genera *Phlomis* and *Stachys*, with records from *S. byzantina* recorded by Pelikan (1995) (as *N. hammani* Priesner), Mantel & Vierbergen (1996) and Vierbergen (2001). The species' range is primarily across the southern Palearctic, at warmer latitudes, from Spain to Azerbaijan, although Fauna Europaea (<http://www.faunaeur.org/>) records the species from France, Germany, the Netherlands and Poland. The species has apparently only been recorded twice in the Netherlands, once in 1967 and once at the beginning of this decade (Mantel & Vierbergen, 1996; Vierbergen, 2001). The Dutch cases were both associated with swarming behaviour by the thrips, in one case with large numbers found overwintering behind wallpaper in a domestic living room. No hint of swarming behaviour can be attached to the British findings.

The fact that the two British populations were found so far apart, in each case on well established plants, suggests that *N. dalmatica* is likely to be established here. Vierbergen, however, has suggested that the species would not be able to survive in the Netherlands without a means of overwintering under protected conditions, such as within heated buildings. Here the thrips were highly visible on the plants, not least because of the numbers present. Thrips were not noticed on the plants in previous years, although in the York case the householder is a keen gardener. Nevertheless, it remains possible that the thrips were present, possibly in lower numbers, and were introduced with one or more of the plants; but this would have required the population to have survived at least three winters. Lamb's ear is commonly grown in British gardens, and is also present across the country as a garden escape. Together, with other potential hosts in the Lamiaceae, this provides a reservoir of plants from which these particular infestations might have originated, although the precise date of introduction (natural or mediated by man) can only be a matter of conjecture. Whether the species will be found on the same plants in future years, or indeed elsewhere in Britain, remains to be seen.

Neoheegeria dalmatica is a medium to large brown haplothripine species (Fig. 1), with four sense cones on antennal segment IV, a well developed maxillary bridge, and medially constricted forewings with duplicated cilia. However, unlike members of the genus *Haplothrips*, the species has three strong sense cones on antennal segment III (*Xylaplothrips subterraneus* (Crawford) [treated as *Haplothrips subterraneus* Crawford in Mound *et al.*, 1976], which similarly has three sense cones on antennal segment III is restricted to lily bulbs and is only present on the British list due to the quarantine interception, by the United States, of the type series on exported British bulbs). It may additionally be characterised by the presence of the following characters: predominantly brown antennal segments, although many specimens have patches of yellow diffusing upwards into the brown from the bases of segments III–VI; long, pale, pointed postocular setae; well developed, long or moderately long, pale, pointed major setae on the pronotum (anteromarginals, anteroangulars, midlaterals, epimerals, and posteroangulars); maxillary stylets widely separated in the head; clear wings, apart from at the base, where three long, pale pointed setae are set in a triangular rather than linear arrangement; brown mid- and hind-tarsi; a normally-sized fustis; no development of metathoracic sternopleural sutures extending backwards from the mid-coxal cavities. The females mostly lack a fore tarsal tooth, although a few individuals were found to have a very small tooth on one or both tarsi. In the male, the fore tarsal teeth are well developed (there is variable allometric growth with some individuals displaying both larger fore femora and larger fore tarsal teeth). The male pseudovirga is slender, but widened at the apex to give a clasper-like effect. No other phlaeothripid is associated with *S. byzantina*. The first-instar larva is pale with light brown sclerotisation on the antennae, thorax, legs and abdominal segments IX–X (Fig. 2).

FRANKLINIELLA PALLIDA

Seven adult female and one adult male *Frankliniella pallida* (Uzel) (Thysanoptera: Thripidae) were collected from flowers of biting stonecrop, *Sedum acre* L. (Crassulaceae), growing on small patches of wasteland near to a small car park at Denham Quarry, Denham, Buckinghamshire, on 19.vi.06. The species determination was made using keys by Vierbergen (1995) and Strassen (2003), and after comparison against specimens of *F. pallida* and other species in the collections of the Natural History Museum, London (NHM). *Thrips tabaci* Lindeman and *T. fuscipennis* Haliday were also beaten from the same plants.

Frankliniella pallida is a flower thrips feeding on pollen, found across continental Europe and further east to Kazakhstan and Iran (Strassen, 2003). It has also been recorded from Tunisia (Nakahara, 1997) and China (Feng, 1992). One specimen held by the NHM is labelled as having been collected from Siberia without more specific location details (*Polygala sibirica*, 18.viii.1928, O. Skolop). The species is polyphagous, with records from the following plant genera: *Helianthemum* (Asteraceae); *Brunellia* (Brunelliaceae); *Dianthus* (Caryophyllaceae); *Sedum* (Crassulaceae); *Dipsacus* (Dipsacaceae); *Lotus*, *Genista*, *Ononis*, *Trifolium* (Fabaceae); *Thymus* (Lamiaceae); *Polygala* (Polygalaceae) (specimen collection labels, NHM, London; Bagnall, 1934; Mound, 1968). However, Vierbergen (1995) notes that the preferred host in the Netherlands is *S. acre*.

Nakahara (1997) recorded 159 species in the genus *Frankliniella*, the majority of which are found in the New World. *Frankliniella pallida* is one of just four species found naturally in Europe (the others being *F. intonsa* (Trybom), *F. nigriventris* (Uzel) and *F. tenuicornis* (Uzel)); a further three species are synanthropic, introduced



Figure 1. *Neoheegeria dalmatica*, adult male.



Figure 2. *Neoheegeria dalmatica*, first-instar larva.

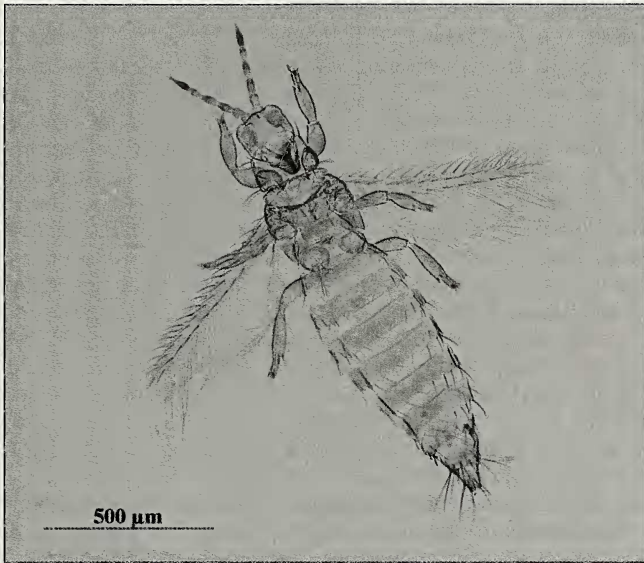


Figure 3. *Frankliniella pallida*, adult female.



Figure 4. *Frankliniella pallida*, chaetotaxy of the head and pronotum.

species associated with commercial horticulture (*F. fusca* (Hinds), *F. occidentalis* (Pergande) & *F. schultzei* (Trybom)).

Frankliniella pallida is a predominantly pale yellow species with light brown patches on the abdominal tergites (Fig. 3). Strassen (2003) notes that occasionally the head and thorax are yellow brown, or the abdomen is brown. Of the other *Frankliniella* species recorded from Britain, *F. intonsa* and *F. tenuicornis* are both predominantly brown in colouration, making them visually distinct from the paler *F. pallida* even in the field. *Frankliniella schultzei* is restricted to quarantine interceptions and unlikely to be encountered in the wild (Collins, 2006). In Britain, *F. pallida* is most likely to be compared with the introduced pest species, *F. occidentalis*, even though that species is confined to protected cultivation. The latter is, however, widely distributed in commercial glasshouses, and has been occasionally found outdoors in the immediate vicinity of glasshouses in the summer months. There is no documentary evidence that *F. occidentalis* has survived and persisted outdoors in Britain independent of a protected environment and such a finding would be of considerable interest to agricultural scientists (e.g., see McDonald *et al.*, 1997). The two species can be separated by differences in the chaetotaxy of the head and pronotum as described below in the key.

Frankliniella pallida is not the only species in the genus to have been introduced to Britain since the publication of the key to British species of thrips in the relevant Royal Entomological Society handbook (Mound *et al.*, 1976); *Frankliniella occidentalis* was first introduced to British commercial glasshouses in 1986 (Baker *et al.*, 1993). An updated key to the species of *Frankliniella* recorded from Great Britain is therefore presented below. Mound *et al.* (1976) regarded *Iridothrips iridis* (Watson) as an aberrant species of *Frankliniella* and included it in their key for the British *Frankliniella*. This was not generally accepted and current practice (e.g., Strassen, 2003) is to treat *Iridothrips* as a valid genus, although Mound (2002) argues that the two species in the genus, *I. iridis* and *I. mariae* Pelikan are probably not closely related at all. *Iridothrips iridis* is included in the key below in order to allow it to be used as a continuation from the generic key for the Thripidae presented in the RES Handbook.

KEY TO THE SPECIES OF *FRANKLINIELLA* FOUND IN BRITAIN

1. Internal furca of mesothorax without a median spinula; sense cone on antennal segment III simple; ♀ usually micropterous, ♂ always micropterous; metanotal median setae slim, no more than half as long as the metanotum; tergites sculptured between median pair of setae; head strongly prolonged in front of eyes *Iridothrips iridis* (Watson)
In leaf sheaves of Iris pseudacorus.
- Internal furca of mesothorax with a median spinula; sense cone on antennal segment III forked; both ♀ and ♂ always macropterous; metanotal median setae three-quarters the length of the metanotum; tergites not sculptured between median setae. **2. (British species of *Frankliniella*)**
2. Metanotum without campaniform sensillae **3**
- Metanotum with two campaniform sensillae. **5**
3. Head relatively long, clearly projecting forwards (but by no more than the length of the diameter of an ocellus) between anterior margin of eyes and the base of the antennae; female body colouration dark brown, male paler; antennal segments III–IV pale, V uniformly dark; posterior margin of abdominal

- segment VIII with an irregular comb of broadly-based, but very short, microtrichia. **tenuicornis** (Uzel)
Relatively common and widespread; in grasses.
- Head not extended so in front of the eyes 4
- 4. Ocellar setae III placed well in front of a line joining the anterior margins of the posterior ocelli; posterior margin of abdominal segment VIII with the comb present and developed medially in the female, comb absent in the male; base of sense cone on antennal segment VI normal; female body colouration brown, male paler; antennal segments III-IV and at least the base of V pale **intonsa** (Trybom)
Relatively common and widespread; polyphagous, in flowers.
- Ocellar setae III located close together (placed apart about four times the diameter of one of the setal bases) and placed on, or just behind, a line joining the anterior margins of the posterior ocelli; posterior margin of abdominal segment VIII with sparse, short, microtrichia in the lateral thirds only, or the comb absent; base of sense cone on antennal segment VI enlarged, more oval than circular (can be difficult to see); female body colouration brown or pale **schultzei** (Trybom)
Species found around the world but with a very restricted distribution in Europe; in Britain, commonly intercepted on imported cut flowers; only one female ever found in Britain outdoors (Pinus, Berkshire, 1914).
- 5. Postocular seta S4 about three times the length of the other postocular setae and nearly as long as ocellar setae III; pronotal anteromarginal setae nearly as long as the anteroangular setae; usually four minor setae between the anteromarginal setae (occasionally 2 or 3); female of adventive form usually with dark yellow/orange head and thorax, and brown abdomen **occidentalis** (Pergande)
The 'western flower thrips'; first introduced into Britain in 1986, now commonly found in commercial glasshouses, particularly those growing ornamental flowers; polyphagous, in flowers.
- Postocular seta S4 sometimes a little longer than the other postocular setae but at most about twice as long, clearly shorter than ocellar setae III; pronotal anteromarginal setae much shorter than the anteroangular setae, about half as long (Fig. 4); two minor setae between the anteromarginal setae; female predominantly pale with light brown patches on the abdominal tergites **pallida** (Uzel)
Known from one population (Sedum acre flowers, Denham, Buckinghamshire, 2006).

DISCUSSION

This paper records the first British findings of two species of thrips known from continental Europe, *Frankliniella pallida* and *Neoheegeria dalmatica*. Because the distribution of British, and indeed European, thrips records is heavily influenced by the collecting activities of a very small number of researchers, it is difficult to draw hard conclusions from isolated records as to the current distribution of more rarely collected species, and the nature and speed of their spread. Nevertheless, both species here were found on the host plants with which they are particularly associated in the Netherlands (albeit with only two records in the case of *N. dalmatica*), where the nearest continental geographic records are to be found. It is reasonable to predict that *F. pallida* will be found more widely, at least in southern England. The (relatively) high visibility of *N. dalmatica* on *S. byzantina* in domestic gardens should

mean that entomologists alerted by this paper will soon be able to confirm, or refute, the suggestion that the species is established in Britain.

Voucher specimens of both *F. pallida* and *N. dalmatica* have been deposited in the collections of the NHM, London, and the Central Science Laboratory (CSL), York.

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